Land Conservation and Renewable Energy Development: Finding a Balance in a Warming World

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National Wildlife Federation

NRDC — The Earth's Best Defense

Sierra Club — Founded 1892

Union of Concerned Scientists — Citizens and Scientists for Environmental Solutions

Western Resource Advocates

The Wilderness Society

Our nation's vast and varied lands will play a central role in the transition from fossil fuels to renewable energy and energy efficiency. Since the early 19th century, our public, private, state, and tribal lands have been a vital source of the raw energy inputs that power the country. As we transition to a clean energy economy, these lands will supply the nation with renewable energy from sources such as the sun, wind, and the earth. Along with other land ownership types, public lands will play an important role in these 21st century solutions to our energy needs.

The nation needs a comprehensive energy policy rooted in energy efficiency and conservation. Enhancing the efficiency of our technologies and using only what we need is the cheapest, simplest, and most environmentally sound way to reduce consumption of fossil fuels. However, these actions alone will not be enough. The nation must be repowered with new renewable energy technologies at the small and large scale. Clean energy generation must be developed and deployed immediately to meet the climate challenge.

Renewable energy potential in the U.S. is enormous, and a significant portion of renewable resources can be found on public lands. Because of the size and nature of many large-scale renewable energy projects, they must be sited to avoid our wildest lands and sensitive fish and wildlife habitat, and great care must be taken to limit environmental impacts to our precious landscapes. By working together to strike a balance between ecosystem services and the need for renewable energy, we can protect our valued and unique open spaces and simultaneously meet our energy and climate challenges.

Sawtooth Mountains, Idaho
(wilderness.net)

The Role of Landscapes in a Changing Climate

Our natural ecosystems provide key benefits and services to people, flora, and fauna across the country. Uses of both public and private lands include but are not limited to: recreation, grazing, hunting and fishing, species habitats and biodiversity, natural resource extraction, scenery, and as the setting of many refuges and other protected areas. They also play an important role in capturing and storing carbon emitted by fossil fuel power, tremendously assisting the fight

against global warming. The value of intact ecosystems in combating climate change cannot be understated. Lands, like oceans, are a critical link in the carbon cycle, continuously removing carbon dioxide from the air and storing it for long periods. Weakening this link will accelerate the climate impacts of fossil fuel emissions. The Congressional Budget Office reported that lands in the United States alone have the potential to sequester "about 40 billion to 60 billion metric tons of carbon dioxide over the course of 50 years and another few tens of billions of tons over the following half-century."[1] In addition to sequestration, ecosystems are important for the stocks of carbon they already contain, which should be safeguarded, not emitted.

Bob Marshall Wilderness, Montana
(wilderness.net)

Additionally, wildlands help both natural and human communities cope with the unavoidable effects of global warming by supporting biodiversity, protecting air and water quality, and by providing corridors of undisturbed habitat. In fact, land use policies that conserve migration corridors may also improve the likelihood that some species survive as climate changes.[2] There must be a balance between addressing the near-term need to site renewable energy facilities with the long-term impacts of climate change.

Renewable Energy at Every Scale

In the United States, there are significant opportunities for new generation that maximize the use of the existing built environment. Small-scale, or "distributed," generation such as rooftop solar panels minimizes the amount of land required for development and does not require construction and maintenance of transmission infrastructure. This type of generation can be well-suited for remote areas that are far from population centers, congested urban areas where electric grids are at or near capacity, communities looking to avoid the substantial cost of constructing new transmission and distribution lines, and other areas with excellent renewable resource potential and local electricity needs. Additional potential benefits of distributed generation include greater reliability and security, lower costs for consumers, and efficiency gains from reduced energy losses from transmission.[3]

Solar panels on a roof
(househunting.ca)

However, our country has traditionally relied on centralized generation and an immense transmission network to bring energy to where we live and work. Almost all of our current electricity supply comes from utility-scale power; only about 0.5% of total U.S. electricity generation comes from non-utility scale generation.[4] Utility-scale plants benefit from the

[1] United States Congressional Budget Office. "The Potential for Carbon Sequestration in the United States." September 2007." http://www.cbo.gov/ftpdocs/86xx/doc8624/09-12-CarbonSequestration.pdf
[2] Pew Center on Global Climate Change. "Coping With Global Climate Change: The Role of Adaptation in the United States." June 2004. http://www.pewclimate.org/docUploads/Adaptation.pdf
[3] U.S. Department of Energy, Electricity Deliverability and Energy Reliability. "Distributed Energy Program." http://www.eere.energy.gov/de/
[4] United States Congressional Budget Office. "Prospects for Distributed Electricity Generation." September 2003. http://www.cbo.gov/doc.cfm?index=4552&type=0

Wind turbines
(Bureau of Land Management)

economies of scale that come from producing large amounts of electricity from a single capital investment. Power is then "wheeled" through the grid to consumers.
Renewable energy can also be produced using this same model. Because the best renewable resources are often far from population centers where people live and work, new transmission lines will also be needed to transfer this immense amount of new renewable energy to load centers. But, since long lines may cross areas with sensitive lands or habitat, they must be properly sited to minimize impacts to precious places.

In addition, requirements must be included to ensure that transmission lines serve renewables, and not carbon-heavy generation such as coal-fired power plants that will cause further harm to the environment.

Energy Development and Land Use Impacts

Some utility-scale renewable energy plants require a potentially large amount of land to site their facilities, but such land use must be considered in context. Analyses that suggest that power generated by renewable energy has greater land use impacts than fossil fuel-generated power, for example, often only take into account the footprint of fossil-fuel generation facilities, as opposed to capturing the "upstream" or full-cycle impacts of energy extraction, transportation, and generation.[5] Coal and natural gas that fuel electric power plants have multiple impacts to lands. For example, coal extraction destroys large tracts of ecosystems and habitats by way of strip mining and mountain top removal, and slurry wastes account for significant pollution in natural places. Transportation and burning of coal also impact air, water, and wildlife. Similarly, natural gas extraction has life-cycle impacts associated with drilling, pipelines, staging areas, and compressor stations. In some instances – e.g., Wyoming's Upper Green River Valley between the Wyoming and Wind River Ranges – impacts affect entire landscapes. In other words, the "land footprint" for—and negative impacts of—these fossil-fuel resources incorporate far more than merely the site of the power plant. Renewable energy facilities are also often more compatible with existing agricultural land-uses, allowing, for example, farmers to continue to plant crops around wind turbines.

Life-cycle analyses are appropriate regardless of the type of energy source. Other potential adverse environmental impacts must be taken into account when energy projects, including renewable energy ones, are planned and sited. For example, wind power can be compatible with other land-uses, but the installation and maintenance of wind turbines, associated roads, and perimeter fencing can fragment habitat, lead to soil erosion and pollution from runoff, and can significantly impact bird and bat populations.[6] Large-scale solar projects can require major landscape changes over thousands of acres, as land must be properly graded and vegetation must be removed to reduce the risk of fire.[7] Geothermal projects can deplete groundwater resources or lower the water table during drilling, and can emit low levels of some pollutants.

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[5] See, for example: Eilperin, Juliet and Steven Mufson. "Renewable Energy's Environmental Paradox." *The Washington Post*. April 16, 2009. http://www.washingtonpost.com/wp-dyn/content/article/2009/04/15/AR2009041503622.html
[6] Bureau of Land Management Wind Programmatic Environmental Impact Statement. Chapter 5, pages 1, 5. http://windeis.anl.gov/documents/fpeis/maintext/Vol1/Vol1Ch5.pdf
[7] Western Governors' Association Western Renewable Energy Zones – Zone Identification and Technical Analysis Work Group. "Resource Criteria for Development of Candidate Study Areas." p. 9, 11. http://www.westgov.org/wga/initiatives/wrez/zita/ZITA%20TC%20criteria%20presentation.ppt

Balance Through Proper Siting

As with all energy options, the social and ecological impacts of renewable energy development must be assessed through science-based planning processes with opportunities for robust public involvement. In order to ensure high-quality and legitimate development decisions and minimize controversy, renewable development planning on public lands must include meaningful and early opportunities for public engagement. Planning should assess ecological and social impacts, linkages between habitats, and the cumulative effects across administrative boundaries.

Organ Pipe Cactus National Monument, Arizona (wilderness.net)

Land that has already been disturbed should be given preference for development. Whether in private or public ownership, land that has been used for industrial, agricultural, or other intensive human purposes is generally superior to "greenfield" sites in term of reduction of environmental degradation. Redevelopment of disturbed sites offers opportunities to improve lands that may not otherwise be reclaimed. When siting new power lines to bring renewable energy to market, existing transportation, telecommunication, pipeline and power line corridors should be utilized to the maximum extent to minimize new impacts. And, technology that results in the lowest environmental impact should be given preference, such as underground or superconducting cables for transmission lines.

Renewable energy can be appropriate on both public and private lands if sited properly. In addition to contributing to our environmental goals, clean energy offers significant opportunities to contribute to our economic prosperity. Renewable energy development can offer tax benefits to local communities and benefits to landowners through sale or lease of their property in the case of private lands, and potentially offer several times the employment of fossil-fuel alternatives.[8] However, whether on private or public lands, great care must be taken to ensure that renewable energy development avoids high value habitat and sensitive lands wherever possible, or minimizes and mitigates impacts where development occurs.

Unique Role of Public Lands

Interest in utility-scale renewable energy development in the U.S. has been increasing. Wind development has occurred on both public and private lands, while most solar development so far has been on private lands. However, approximately 200 applications for solar development on public lands are pending. Because renewable energy is a new and exclusive use of traditionally multiple-use public lands, it is important that public land management agencies weigh both the environmental and opportunity costs and benefits when assessing the potential of any of these pending projects, by way of full environmental review, a transparent public process, and a thorough discussion of impacts, alternatives, and mitigation techniques.

In addition to increased energy conservation and attention to energy efficiency measures, a dramatic and rapid shift to renewable energy is needed to avoid catastrophic climate change. Public lands can and should be a part of the solution. By setting in place intelligent, forward-thinking policy and guidance now, we can ensure responsible renewable energy development that serves our energy needs, helps meet our climate change goals, and protects natural ecosystems and priceless public lands.

[8] See, for example, Union of Concerned Scientists. "Clean Energy, Green Jobs." 2009. www.ucsusa.org/25by25